Changes in Healthcare Use Across the Transition from Civilian to Military Life

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SUMMARY

Patterns of healthcare use in a sample of young adults entering the US Navy ($N = 1137$) were examined in a longitudinal survey study. Baseline data provided information about healthcare use as a civilian, whereas follow-up data were used to examine changes in patterns of use over time following entry into the Military Health System (MHS). Entrance into the MHS was marked by increased use of preventive care. Although few systematic differences were noted with respect to socioeconomic status or race/ethnicity, women consistently used more healthcare than did men, and women's use increased more over time; however, this increase was largely driven by pregnancy during military service. Findings suggest that individuals with access to universal healthcare are likely to increase their overall use of services. However, these effects were quite small in absolute terms, and they were strongest for preventive care rather than more intensive and expensive services. Published 2013. This article is a US Government work and is in the public domain in the USA.

KEY WORDS: healthcare use; military; young adulthood; longitudinal; disparities

INTRODUCTION

Unlike most advanced industrialized countries, in the USA, the transition from adolescence to young adulthood (defined here as 18 to 24 years) has been marked by the simultaneous loss of access to childhood safety net programs and increased personal responsibility for healthcare management. This particular responsibility can be a challenge because young adults often abruptly "age out" of their existing health insurance coverage, particularly if they do not enroll full-time in college after graduating from high school (Adams *et al.*, 2007; Nicholson *et al.*, 2009). Within the dominant employer-provided health insurance coverage system, young adults in entry-level positions are relatively unlikely to gain access to insurance, and they are less likely than their older counterparts to enroll in employer-sponsored insur-

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ance plans when given the option (Callahan and Cooper, 2005; Adams *et al.*, 2007; Levine *et al.*, 2009; Nicholson *et al.*, 2009; Long *et al.*, 2010).

As a result of these factors, young adults are less likely to be insured than any other age group. In fact, recent data suggest that up to one third of young US adults are uninsured at some point during a given year (Adams *et al.*, 2007; Levine *et al.*, 2009; Nicholson *et al.*, 2009). With the implementation of the Affordable Care Act on 23 September 2010, civilian health plans that provide coverage to children must now make that coverage available until the child turns 26 years of age. National Center for Health Statistics data suggest that between September 2010 and June 2011, 2.5 million young adults were added to their parents' insurance plans (Martinez and Cohen, 2011; Sommers and Schwartz, 2011). Despite these gains, young adults are still the least likely to be insured of any group (Martinez and Cohen, 2011).

The lack of insurance among young adults can pose significant obstacles to obtaining healthcare (Callahan and Cooper, 2005). Although young adulthood is generally a time of good health, approximately 15% of young adults are already affected by a chronic disease (National Center for Health Statistics, 2009). Young adulthood is also a period of uniquely high risk for some specific health problems, including injuries, sexually transmitted infections (STIs), substance abuse, and psychiatric disorders (Callahan and Cooper, 2005, 2010; Park *et al.*, 2006). Not surprisingly, young adults who lack insurance coverage have fewer contacts with healthcare providers than do young adults with insurance (Fortuna *et al.*, 2009; Anderson *et al.*, 2010).

Given the unique challenges associated with this life stage, it is surprising that young adults' need for, access to, and use of healthcare services has been understudied relative to that of adolescents and older adults (Callahan and Cooper, 2005, 2010; Park *et al.*, 2006). The primary goal of the present study was to examine patterns of healthcare use in a sample of young adults entering the US Navy and to examine changes in patterns of use over time following entry into the Military Health System (MHS). The MHS is a government-run healthcare system provided as part of the compensation package for all active-duty military personnel. By removing structural barriers to healthcare, the MHS essentially creates a quasi-experiment to evaluate the effects of unrestricted access to care on rates of use. In particular, we explored differences in patterns of healthcare use across sex, racial/ethnic, and socioeconomic status (SES) groups, while controlling for group differences in health status.

Although uninsured individuals encounter significant obstacles to obtaining healthcare (Callahan and Cooper, 2005), it is not clear that insurance coverage fully explains differential use of services. Other factors that play a role include demographic characteristics such as sex and race/ethnicity, as well as healthcare needs. Some previous research has examined differences in health concerns as a function of sex and race/ethnicity among young adults, but these variables often have been considered in isolation, or without controlling for group differences in SES (Courtenay, 1998). Nonetheless, existing research suggests that there are substantial health differences by sex and race/ethnicity. For example, mortality statistics for young adults show higher rates of death among men than women, and among African Americans compared with members of other ethnic groups (Centers for Disease Control and Prevention, 2011). Although some of these differences result

from disparities in rates of injury due to accidents or violence, there also are significant sex and racial/ethnic differences in a variety of other factors related to physical health, including substance use, mental illness, risky sexual behaviors, STIs, overweight/obesity rates, physical activity, and cardiovascular risk factors (Mensah *et al.*, 2005; Park *et al.*, 2006). For example, whereas young women report poorer health than young men overall, young men are more likely to suffer from heart disease and cancer (Courtenay, 1998; Gerritsen and Deville, 2009). With respect to race/ethnicity, with few exceptions (e.g., substance use and serious mental illness), White young adults fare better than their African American and Hispanic peers (Mensah *et al.*, 2005; Park *et al.*, 2006; James *et al.*, 2009). For example, African Americans have the highest prevalence of hypertension of any racial/ethnic group, and these differences are most pronounced during young adulthood (Mensah *et al.*, 2005). To further complicate matters, racial/ethnic differences in young adults' health outcomes sometimes show different patterns for men and women (Park *et al.*, 2006).

Like healthcare needs, healthcare use varies substantially across demographic groups. A consistent research finding in the general population is that women receive more healthcare than do men, and this is true of young adults as well (Ziv *et al.*, 1999). In a national probability sample, young women had more than twice as many ambulatory care visits as young men (Fortuna *et al.*, 2009). The greater healthcare use of women held true across a variety of types of visits (e.g., preventive, pre- and post-operative) and types of medical problems (acute and chronic), with the greatest sex difference in rates of preventive care. Different healthcare use trajectories by sex begin in young adulthood. During adolescence, boys and girls use services at similar rates (Ziv *et al.*, 1999; Marcell *et al.*, 2002). Compared with male adolescents, young adult men use fewer healthcare, and particularly preventive care, services; in contrast, young adult women use more services relative to female adolescents, largely because of increasing use of reproductive healthcare services (Marcell *et al.*, 2002; Fortuna *et al.*, 2009; Callahan and Cooper, 2010).

Sex differences in healthcare use may largely be accounted for by differences in actual health needs, particularly when reproductive health needs are considered. Among young adult women, reproductive health services dominate healthcare use, with childbirth accounting for the highest number of hospitalizations, and contraception and gynecological care accounting for the most outpatient doctor visits and prescription medications (Park *et al.*, 2006). By contrast, differences in healthcare use based on race/ethnicity cannot be explained by differences in healthcare needs. White Americans generally use more healthcare services than any other racial/ethnic group (Fortuna *et al.*, 2009), despite the fact that they report the best health (Mensah *et al.*, 2005; Park *et al.*, 2006; James *et al.*, 2009). Complex social, cultural, and economic patterns may differentially impact specific subgroups. These disparate patterns highlight the importance of controlling for health status to understand the relationship between healthcare access and actual healthcare use.

Demographic disparities in insurance coverage may further exacerbate differential healthcare use patterns. Group differences in insurance coverage generally mirror sex and racial/ethnic differences in healthcare use. Among young adults, men are more likely than women to be uninsured. Among young adults with insurance, men are more likely to have private health insurance than women, whereas women

are more likely than men to have public healthcare coverage (Callahan and Cooper, 2005). Overall, the proportion of healthcare expenses paid out of pocket by young adults increases more for men than for women (Callahan and Cooper, 2010). Young adults from low-income households are less likely to be insured than those from higher income households; in one 3-year longitudinal study, nearly two thirds of low-income young adults went without coverage for at least part of the study period (Nicholson *et al.*, 2009). Likewise, Hispanic and African American young adults are at greater risk of being uninsured than are White young adults (Nicholson *et al.*, 2009). Although citizenship status further complicates racial/ethnic differences, even after controlling for this, Hispanic young adults are at higher risk of being uninsured than their White peers (Callahan *et al.*, 2006).

Present study

The US military provides a unique context in which to examine the healthcare use patterns of young adults by taking differences in insurance status out of the equation. In contrast to their civilian peers, young adults who enter the military gain equal access to the MHS, a government-run system that serves all Department of Defense service members, retirees, and their dependents as part of their employment compensation. Because structural and financial barriers to care that exist in the civilian world are eliminated in the military, demographic differences in healthcare use observed in the civilian world (e.g., as a function of race/ethnicity, sex, or SES) are likely to be mitigated in the military context. We investigated this possibility by examining changes in self-reported use of several specific types of healthcare services from the year before military service to the second year of service in a heterogeneous sample of Navy recruits. Specifically, we examined patterns of use over time as a function of sex, race/ethnicity, and SES, after controlling for individual differences in health status.

We expected that healthcare use would increase from the civilian to the military period, as all personnel would have unrestricted access to care through the MHS. In addition, we expected to replicate the previously observed sex difference in healthcare use, with women consistently reporting higher levels of use than men. Because these differences to some degree reflect sex differences in healthcare needs (e.g., with respect to reproductive health), we did not necessarily expect them to diminish during military service. In contrast, although we expected to observe racial/ethnic and SES differences in baseline healthcare use, we expected these differences to be attenuated at follow-up.

These hypotheses were examined with respect to use of five types of care: outpatient doctor visits, emergency department visits, overnight hospitalization, outpatient injury treatment, and outpatient surgery and aftercare. We expected that between-group differences in use would be more pronounced for more elective types of services (e.g., outpatient doctor visits) than for less discretionary services (e.g., hospitalization). Finally, we conducted supplementary analyses to examine the extent to which women's greater use of healthcare services might be linked to pregnancy. This issue is important given that the most frequent reason for healthcare use among young women is reproductive health (Park *et al.*, 2006).

METHODS

Participants and procedures

Analyses for this report were conducted using data from the Naval Health Research Center Survey of Recruits' Behaviors (SRB). Between June 1996 and June 1997, 5498 US Navy recruits at the Recruit Training Command, Great Lakes, Illinois, participated in the first wave of a 2-year longitudinal study of adjustment into service life. To oversample women, all available participants in sex-integrated units were invited to participate in this voluntary survey during their first week of basic training (response rates: men, 94%; women, 93%). At that time, participants granted permission to merge information from military personnel records with their survey responses in order to track military service outcomes. Follow-up surveys were mailed to personnel remaining on active duty after 6 months, 1 year, and 2 years of service. However, the present report only made use of baseline and final 2-year follow-up survey data.

After excluding participants who did not provide complete data regarding premilitary healthcare use (6%; $n = 332$), the baseline sample included 5166 participants. Approximately half were male (52%). Participants were diverse in ethnicity, with 61% White, 19% African American, 11% Hispanic, and 9% other. The majority (54%) of participants described the income level of their family of origin as lower middle to middle class ($15 000 to $49 900). Most participants were young (mean [M] = 19.69, standard deviation [SD] = 2.55, range: 17–35 years), single (90%), high school graduates (84%), with no dependent children (92%).

After 2 years of service, among personnel in the baseline sample who remained on active duty and who could be contacted by mail, 29% (1137/3889) returned the follow-up survey with complete healthcare data. Attrition analyses comparing baseline participants who did or did not provide follow-up data revealed no significant differences in age, race/ethnicity, education, family of origin income level, marital status, dependents, lifetime physical health problems, recent symptoms of illness, or use of healthcare during the 12 months prior to entering military service. However, female personnel were somewhat overrepresented in the longitudinal sample (46% excluded vs. 54% included; $\chi^2[df\ 1, N = 5166] = 21.82, p < 0.001, \Phi' = 0.06$).

Measures

Demographic questionnaire. The baseline SRB gathered basic demographic data, including the date of survey completion, date of birth, sex, ethnicity, education, and marital status. Participants also answered a single item about SES or family income: "What is your best guess of your family's total income last year?" ($1 = under$ *$10 000* to $7 = $75 000 or more$; $M = 4.18$ [$25 000 to $34 900], $SD = 1.74$).

Medical history. At baseline, lifetime physical health problems were assessed using the Sailor's Health Inventory Program (SHIP) survey (Mittelman *et al.*, 1998). The SHIP, designed to identify personnel needing specialized healthcare or health education, was completed by all recruits during basic training upon enrollment in the MHS. Using a yes/no response format, the 191-item SHIP asks about lifetime history of a broad range of mental and physical health problems ("Have you had or do you

have any of the following?"). An index of lifetime physical health problems was computed as the number of the 147 physical problems endorsed (e.g., history of head injury, asthma, and stomach ulcer; range, 0 to 35, $M = 1.81$, $SD = 2.41$).

In addition, at both baseline and follow-up, the SRB included a single question assessing recent symptoms of illness. Participants were asked how often in the past 12 months they had been "sick with symptoms such as runny nose, watery eyes, feeling flushed or sweaty, having chills, nausea, vomiting, stomach cramps, diarrhea, muscle pains, or severe headaches" (0 to 10+ times, $M = 1.99$, $SD = 2.70$). For the longitudinal subsample, changes in the frequency of symptoms over the 2-year study period were computed by subtracting baseline from follow-up symptom ratings, so that positive scores indicated increases in symptoms (range = -10 to 10, $M = 0.22$, $SD = 3.72$). The female version of the follow-up SRB included an additional item that asked "During the last 12 months, have you been or are you pregnant?" (23% yes).

Healthcare use. The SRB assessed the frequency of five types of healthcare use during the prior 12 months (0 to 10+ times): (i) emergency department visits, (ii) outpatient doctor visits, (iii) overnight hospitalization, (iv) outpatient injury treatment, and (v) outpatient surgery and aftercare. The same questions were asked at baseline and follow-up, except that outpatient care was assessed by two items at baseline (assessing general visits vs. specialized care) but by only one item at follow-up. To create a common response metric and create a single outpatient care score, responses to the two baseline outpatient care questions were averaged.

Analytic strategy

Analyses were conducted using IBM SPSS Statistics 19 software package (IBM Corporation, Armonk, NY). The primary hypotheses were evaluated using analysis of covariance (ANCOVA), with sex and race/ethnicity (African American, White, Hispanic, and other) as between-subjects factors and SES as a covariate. Because of limited variability in age, marital and dependent status, and educational attainment, these characteristics were not included as factors. Healthcare service use was examined as a five-level (outpatient, emergency department, hospitalization, injury, and outpatient surgery/aftercare) within-subjects factor. Indices of health status (lifetime physical health problems and recent symptoms of illness) were included as additional covariates in all multivariate analyses. Although significant results for these variables are presented in tables, because of space constraints, findings regarding the control variables are not discussed further.

All healthcare use variables exhibited notable departures from normality and were therefore subjected to square root transformations. However, for clarity of presentation, descriptive statistics are provided in the original response metric. All presented means have been adjusted for the effects of covariates. In addition to reporting the results of *F*-tests, we report partial eta squared (η^2_{partial}) statistics as measures of effect size. Generally, η^2_{partial} values of 0.02 or less are considered small; 0.13, medium; and 0.26, large (Cohen, 1988). More detailed information regarding data analyses is provided later.

RESULTS

Health status at baseline

In this generally healthy sample of young adults, 35% reported no lifetime physical health problems at baseline. Among those who did report prior problems, the modal number was 1 ($M = 2.80$, $SD = 2.50$). The five most commonly endorsed problems were allergies (15%), adverse reaction to serums, drugs, or medicines (9%), sinus problems/sinusitis (7%), skin conditions (7%), and difficulty shaving (7%). Similarly, 43% of respondents reported no symptoms of illness in the year prior to enlistment.

Demographic differences in baseline health status (lifetime physical health problems and recent symptoms of illness) were examined using separate 2 (sex) × 4 (race/ethnicity) ANCOVAs, with SES as a covariate. There were significant differences in baseline health status as a function of both sex and race/ethnicity (Table 1). Women consistently reported more problems than did men, and White and African American participants generally reported more problems than did Hispanic participants or those of other racial/ethnic groups. Neither the main effect of SES nor the sex by race/ethnicity interaction was significant.

Changes in health status over time

To examine changes in symptoms of illness over time, we conducted a 2 (sex) 4 (race/ethnicity) × 2 (time) mixed-effects ANCOVA with SES as a covariate. In this analysis, sex and race/ethnicity were between-subjects factors and time was a within-subjects factor; lifetime physical health problems were included as an additional covariate. Results revealed more reported symptoms of illness during the second year of service than in the year prior to enlistment (M [SE] = 2.33 [0.10] vs. 1.96 [0.10], respectively; $F[1, 1104] = 8.03$, $p < 0.01$, $\eta^2_{partial} = 0.01$). As in the baseline analysis, the effect of SES was not significant, but there was a significant main effect of sex, with women consistently reporting more symptoms than men (M [SE] = 2.42 [0.10] and 1.87 [0.11], respectively; $F[1, 1104] = 14.00$, $p < 0.001$, $\eta^2_{partial} = 0.01$). In contrast to results for the full baseline sample, in the longitudinal subsample, there were no racial/ethnic differences in symptoms of illness; neither the main effect of race/ethnicity nor the two-way interaction with time was significant.

Baseline healthcare use

Consistent with their generally positive health status, participants reported limited healthcare contacts at baseline. In fact, less than half of all participants (44%) reported use of any of the five types of healthcare in the year preceding entry into military service. Outpatient surgery (5%) and hospitalization (5%) were least commonly reported, whereas more routine outpatient doctor visits (28%) and emergency department visits (23%) were most common (injury treatment, 14%). Of those reporting any care, 56% had used only one type of service, and 31% reported only one healthcare visit of any type.

Table 1. Sex and racial/ethnic difference in self-reported health status at baseline

Health indicator	Sex		Race/ethnicity			
	Male	Female	White	African American	Hispanic	Other
Lifetime physical health problems (range, 0 to 35 problems)[†]						
Mean	1.59	2.06***	1.85a	1.97a	1.48b	1.63a,b***
(SD)	(2.32)	(2.49)	(2.51)	(2.29)	(2.21)	(2.16)
N	2644	2409	3072	968	583	430
Recent symptoms of illness (range, 0 to 10+ times)[‡]						
Mean	1.68	2.32***	2.08a	1.92a,b	1.71a,b	1.81b**
(SD)	(2.46)	(2.89)	(2.68)	(2.84)	(2.58)	(2.59)
N	2670	2451	3114	981	589	437

Within rows, means that do not share the same lowercase letters differ significantly at $p < 0.05$ in post hoc comparisons with Bonferroni adjustments.
[†] $F(1, 5044) = 25.09$ ($\eta^2_{partial} = 0.01$) and 5.66 ($\eta^2_{partial} < 0.01$) for sex and race/ethnicity, respectively.
[‡] $F(1, 5112) = 38.99$ ($\eta^2_{partial} = 0.01$) and 4.47 ($\eta^2_{partial} < 0.01$) for sex and race/ethnicity, respectively.
**$p < 0.01$; ***$p < 0.001$.

To examine demographic differences in healthcare use at baseline, we conducted a 2 (sex) $\times$ 4 (race/ethnicity) $\times$ 5 (service type) ANCOVA, with service type as a repeated measure and SES as a covariate. To control for group differences in health status, both lifetime health status and recent symptoms of illness were included as covariates. Results revealed significant ($p < 0.05$) main effects of sex, race/ethnicity, and SES, as well as the health status covariates. However, each of these main effects was modified by a significant ($p < 0.001$) two-way interaction with service type. To illuminate these effects, separate follow-up ANCOVAs were conducted for each type of healthcare service.

Comparisons of baseline service use by sex and race/ethnicity are provided in Table 2. At baseline, women reported more outpatient doctor visits and outpatient surgeries than did men, whereas men reported slightly more injury treatment visits. The number of emergency department visits and hospitalization did not vary by sex. With respect to race/ethnicity, follow-up analyses showed significant racial/ethnic differences in number of emergency visits, outpatient doctor visits, and hospitalizations. The biggest difference was in outpatient visits, with White participants reporting more visits than all other participants. Emergency department visits were most frequent among White and African American participants and least frequent among Hispanic participants. In contrast, Hispanic and African American participants more often than White participants reported hospitalization in the year before military service. Finally, SES was significantly related to outpatient doctor visits, outpatient surgery, and injury treatment ($p \le 0.01$; not shown). Participants with higher SES reported more healthcare contacts than did those with lower SES. This effect was most pronounced for outpatient doctor visits. However, all SES effects were small, explaining less than 1% of the variability in healthcare outcomes.

Changes in healthcare use over time

In the longitudinal subsample, more participants overall reported any type of healthcare use at follow-up than at baseline (58% vs. 45%; χ^2_{McNemar} [$N = 1137$] $= 38.36$, $p < 0.001$). Increases also were significant for each individual type of service (χ^2_{McNemar} [$N = 1137$] ≥ 5.80, $p < 0.05$). The proportional increase in service use over time was greatest for outpatient surgery (13% vs. 5%), followed by hospitalization (12% vs. 5%), injury treatment (27% vs. 13%), outpatient doctor visits (40% vs. 29%), and emergency department visits (27% vs. 23%).

To illuminate group differences in patterns of healthcare use over time, we conducted a 2 (sex) $\times$ 4 (race/ethnicity) $\times$ 2 (time) $\times$ 5 (service type) mixed-effects ANCOVA, where time and service type were within-subjects factors and SES was a covariate. To control for group differences in health status, lifetime physical health problems and changes in symptoms of illness from baseline to follow-up were included as additional covariates. Significant main effects of both time (F[1, 1126] $= 39.58$, $p < 0.001$, $\eta^2_{\text{partial}} = 0.03$) and service type ($F$[4, 4504] $= 24.15$, $p < 0.001$, $\eta^2_{\text{partial}} = 0.02$) were qualified by a significant interaction between these two factors (F[4, 4504] $= 12.28$, $p < 0.001$, $\eta^2_{\text{partial}} = 0.01$). Follow-up analyses revealed that increases in the number of visits from baseline to follow-up were significant ($p < 0.05$) for every type of

Table 2. Sex and racial/ethnic difference in use of healthcare at baseline

Service type, (range, 0 to 10+ visits)	Sex		Race/ethnicity				
	Male $n=2692$	Female $n=2474$	White $n=3131$	African American $n=998$	Hispanic $n=591$	Other $n=446$	
Emergency visit[†]							
Mean	0.39	0.39	0.40a	0.44a	0.32b	0.38a,b*	
(SE)	(0.03)	(0.03)	(0.02)	(0.03)	(0.04)	(0.05)	
Outpatient visit[‡]							
Mean	0.49	0.95***	0.81a	0.69b	0.69b	0.70b***	
(SE)	(0.04)	(0.04)	(0.03)	(0.05)	(0.07)	(0.08)	
Hospitalization[§]							
Mean	0.11	0.10	0.07b	0.10a	0.14a	0.09a,b*	
(SE)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)	
Injury treatment[¶]							
Mean	0.32	0.24*	0.30	0.28	0.30	0.26	
(SE)	(0.03)	(0.03)	(0.02)	(0.04)	(0.05)	(0.05)	
Outpatient surgery[††]							
Mean	0.05	0.09***	0.08	0.07	0.05	0.08	
(SE)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	

Within rows, means that do not share the same lowercase letters differ significantly at $p < 0.05$ in the least significant difference comparison. For all F-tests, $df_{error} = 5155$.
[†]For sex, $F = 1.16$ ($\eta^2_{partial} < 0.01$); for race/ethnicity, $F = 2.74$ ($\eta^2_{partial} < 0.01$).
[‡]For sex, $F = 85.89$ ($\eta^2_{partial} = 0.02$); for race/ethnicity, $F = 7.91$ ($\eta^2_{partial} = 0.01$).
[§]For sex, $F = 0.02$ ($\eta^2_{partial} < 0.01$); for race/ethnicity, $F = 3.62$ ($\eta^2_{partial} < 0.01$).
[¶]For sex, $F = 6.49$ ($\eta^2_{partial} < 0.01$); for race/ethnicity, $F = 1.23$ ($\eta^2_{partial} < 0.01$).
[††]For sex, $F = 14.83$ ($\eta^2_{partial} < 0.01$); for race/ethnicity, $F = 0.87$ ($\eta^2_{partial} < 0.01$).
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

healthcare except emergency department visits. These effects were quite small (0.03 for outpatient visits, 0.02 for outpatient surgeries, and less than 0.01 for other types of healthcare use).

The familiar main effect of sex ($F[1, 1126] = 25.43$, $p < 0.001$, $\eta^2_{partial} = 0.02$) was modified by significant ($p < 0.01$) two-way interactions with time ($F[1, 1126] = 8.54$, $\eta^2_{partial} = 0.01$) and service type ($F[4, 4504] = 25.65$, $\eta^2_{partial} = 0.02$). Total visits increased from baseline to follow-up for both women and men ($p < 0.001$), but the increase was greater for women ($\eta^2_{partial} = 0.05$ vs. 0.03). Compared with men, women reported significantly ($p < 0.001$) more outpatient doctor visits ($\eta^2_{partial} = 0.04$), outpatient surgeries ($\eta^2_{partial} = 0.01$), and emergency department visits ($\eta^2_{partial} = 0.01$), but they did not differ in number of hospitalizations or injury treatments.

There were no significant main effects or interactions involving race/ethnicity. With respect to SES, the main effect was not statistically significant, but there were small two-way (service type by SES; $F[4, 4504] = 3.32$, $p = 0.010$, $\eta^2_{partial} < 0.01$) and three-way (service type by SES by time; $F[4, 4504] = 4.78$, $p = 0.001$, $\eta^2_{partial} < 0.01$) interactions involving this factor. Follow-up ANCOVAs conducted separately for each type of service use revealed a significant main effect of income only for injury treatment ($F[1, 1126] = 5.00$, $p < 0.05$, $\eta^2_{partial} < 0.01$), with respondents from higher SES families reporting more care. Significant ($p < 0.05$) interactions of SES by time were observed for outpatient doctor visits and outpatient surgery ($F[1, 1126] = 8.73$ and 4.61, respectively, $\eta^2_{partial} < 0.01$). These interactions are depicted in Figure 1; increases over time in these two types of healthcare contacts were significant for lower SES respondents ($p < 0.001$, $\eta^2_{partial} > 0.06$), but not for higher SES respondents.

Effects of pregnancy on healthcare use

In a final set of analyses, we explored the impact of pregnancy on female participants' use of healthcare. At follow-up, nearly a quarter of women in the longitudinal subsample (23%) reported that they had been pregnant during the past 12 months. We repeated the analysis of healthcare use over time, but substituted a more qualified "sex/pregnancy" factor (0 = *male*, 1 = *female, no pregnancy*, 2 = *female with pregnancy*) for the original sex variable. Thus, we conducted a 3 (sex/pregnancy) × 4 (race/ethnicity) × 2 (time) × 5 (service type) mixed-effects ANCOVA, with SES as a covariate. As before, time and service type were within-subjects factors, and lifetime physical health problems and change in symptoms of illness were included as covariates. Results were similar to those reported for the earlier longitudinal analysis. Once again, a significant main effect of sex (now sex/pregnancy; $F[2, 1122] = 14.37$, $p < 0.001$, $\eta^2_{partial} = 0.03$) was modified by two-way interactions with both time ($F[2, 1122] = 8.44$, $p < 0.001$, $\eta^2_{partial} = 0.02$) and service type ($F[8, 4488] = 16.46$, $p < 0.001$, $\eta^2_{partial} = 0.03$). However, in contrast to the prior analysis, the three-way interaction among sex/pregnancy, time, and service type also was significant ($F[8, 4488] = 4.82$, $p < 0.001$, $\eta^2_{partial} = 0.01$).
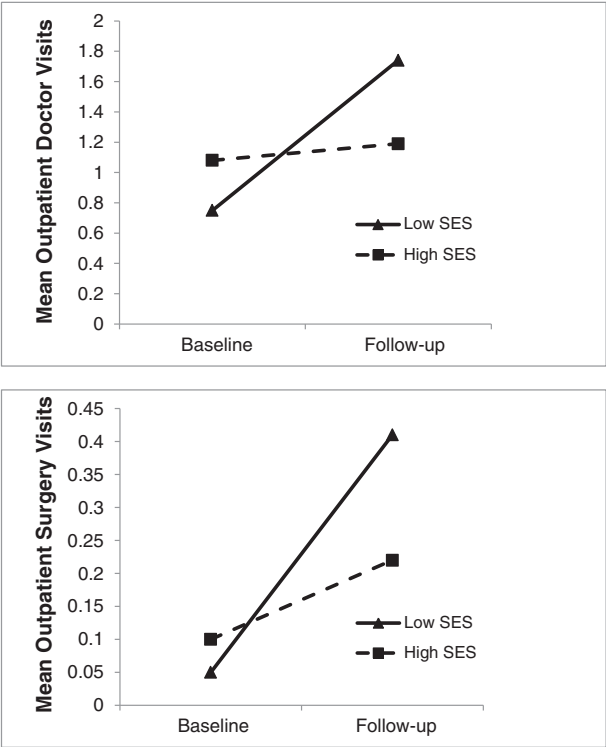
Figure 1. Changes in outpatient doctor and surgery visits over time by socioeconomic status

To explore interaction effects involving the sex/pregnancy factor, follow-up ANCOVAs were conducted separately for each type of healthcare. In this series of analyses, there were no significant sex/pregnancy effects for injury treatment. There was a simple main effect on outpatient surgery ($p < 0.01$), with men ($M = 0.09$) reporting fewer visits than women with or without a pregnancy (means $= 0.22$ and 0.21, respectively). For the remaining three types of service use, the main effect of sex/pregnancy was qualified by a significant interaction with time ($p < 0.01$; $\eta^2_{partial}$ $= 0.01$ for emergency department and outpatient doctor visits, $\eta^2_{partial} = 0.06$ for hospitalizations). These interactions were primarily due to greater increases in healthcare use among women who had been pregnant than among either men or women who had not been pregnant (Figure 2). Among women who were pregnant at follow-up, there was a significant increase over time in outpatient doctor visits ($\eta^2_{partial} = 0.10$) and hospitalizations ($\eta^2_{partial} = 0.13$), and the increase in emergency department visits approached significance ($\eta^2_{partial} = 0.02$, $p = 0.07$). In contrast, for women with no pregnancy and for men, outpatient doctor visits increased significantly but more moderately over time ($\eta^2_{partial} = 0.03$ and 0.04, respectively), whereas hospitalizations and emergency department visits did not increase significantly from baseline to follow-up.
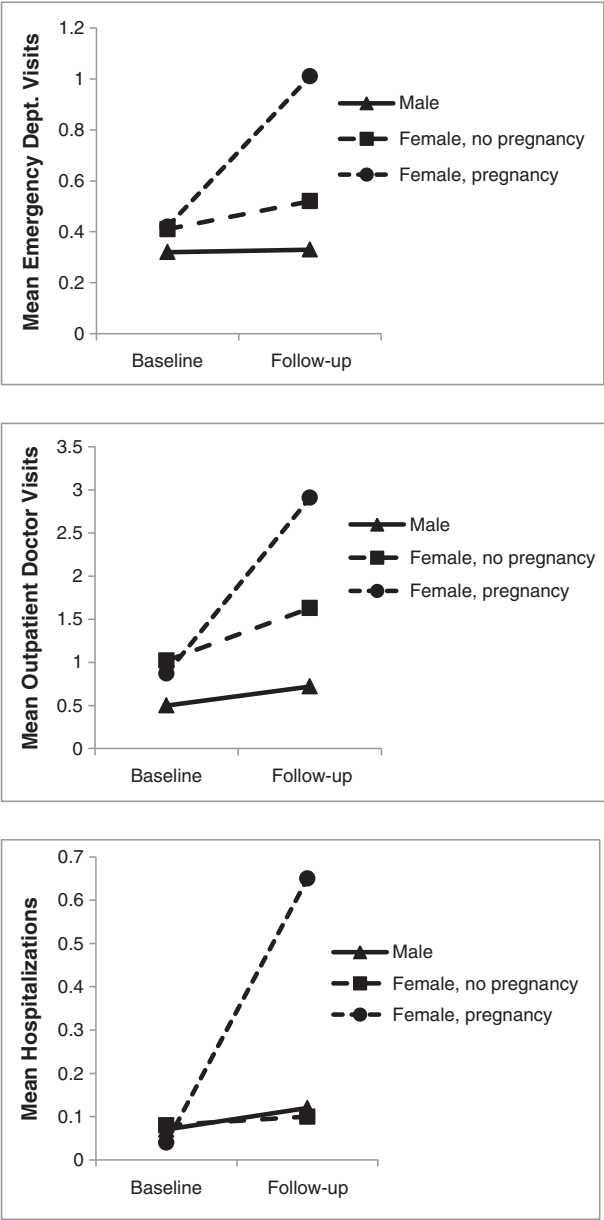
Figure 2. Changes in healthcare use over time by sex and pregnancy

In addition to these effects involving sex/pregnancy status, newly significant interactions involving race/ethnicity emerged from this analysis. Specifically, there was a significant two-way interaction between race/ethnicity and service type ($F[12, 4488] = 3.12$, $p < 0.001$, $\eta^2_{partial} = 0.01$), which was modified by a significant

three-way interaction with time (F[12, 4488] = 1.88, $p < 0.05$, $\eta^2_{partial} = 0.01$). Follow-up ANCOVAs conducted separately for each type of healthcare revealed a significant main effect of race/ethnicity only for outpatient doctor visits (F[3, 1122] = 3.46, $p < 0.05$, $\eta^2_{partial} = 0.01$). African American participants reported significantly fewer visits than White participants (means = 0.94 and 1.39, respectively), with the other two groups being intermediate. The interaction of race/ethnicity by time was significant only for emergency department visits (F[3, 1122] = 4.53, $p < 0.01$, $\eta^2_{partial} = 0.01$). Significant increases in emergency department visits over time were observed only for Hispanic participants ($p < 0.01$). As a result, although baseline emergency department use did not differ by race/ethnicity, at follow-up, Hispanic participants reported more emergency department visits than members of other racial/ethnic groups ($\eta^2_{partial} = 0.09$).

DISCUSSION

The present study explored differences in healthcare use by military personnel across the transition from civilian to military life. Our results supported the hypothesis that use would increase over this transition. Compared with 45% at baseline, at follow-up, 58% of participants in the longitudinal sample reported one or more healthcare contacts in the past year. Further, more respondents reported using each specific type of healthcare during the second year of military service than in the year prior to entering the military. As a ratio, this increase was greatest for the least frequently used types of care (outpatient surgery and hospitalization), with more than twice as many respondents reporting use of these services at follow-up as at baseline. In terms of raw number of visits, however, the increase was greatest for outpatient doctor visits. In contrast, emergency department visits showed a relatively small increase over time, and this increase was not consistently significant across analyses. These results diverge from studies on civilians, which typically show that young adults disproportionately rely on emergency department services rather than outpatient doctor visits (Fortuna et al., 2009; Callahan and Cooper, 2010; Fortuna et al., 2010). In the supplemental analysis of pregnancy's effects on healthcare use, men and nonpregnant women reported significant increased use of outpatient doctor visits, but no significant increased use of emergency department visits. The significant increase in outpatient doctor visits over time observed for men contrasts sharply with civilian evidence showing decreases in visits to primary care providers for men between adolescence and young adulthood (Callahan and Cooper, 2010).

As predicted, and consistent with previous research (Fortuna et al., 2009), women generally used more healthcare services than men. In the present study, this was true even after controlling for sex differences in health status (i.e., lifetime physical health problems and recent symptoms of illness). We had hypothesized that demographic differences would be most pronounced for preventive and discretionary care, and this hypothesis also was supported. In both cross-sectional and longitudinal analyses, women reported more outpatient doctor and outpatient surgery visits, and sex differences were both larger and more consistent for outpatient services than with other types of services. Sex differences in emergency department and injury

treatment visits were not consistent across the two periods, and women and men did not differ in number of hospitalizations at either assessment.

In addition to using more healthcare overall across both periods, women also showed a greater increase in healthcare use from baseline to follow-up. Supplementary analyses revealed that much of this difference was attributable to women who became pregnant during their military service. Overall, respondents showed significant increases from baseline to follow-up in outpatient surgery, outpatient doctor visits, and injury treatment. Compared with men and nonpregnant women, pregnant women showed a significantly larger increase in outpatient doctor visits. Further, of the three groups, only pregnant women showed a significant increase over time in hospitalizations (and a marginally significant increase in emergency department visits). From a practical perspective, the impact of pregnancy on healthcare use is noteworthy given that pregnancy rates are higher among military women than among their civilian counterparts (16% vs. 10%) (Lundquist and Smith, 2005; TRICARE Management Activity, 2009). In our sample, 23% of female recruits reported a pregnancy during the second year of military service.

We found mixed support for the hypothesis that racial/ethnic differences in healthcare use would diminish with universal access to the MHS. At baseline, the strongest racial/ethnic difference was found for outpatient doctor visits, with White participants reporting the greatest use of this type of service. Similarly, White personnel reported the greatest use of outpatient services in the longitudinal subsample, although only when pregnancy status was included as a factor in the analysis. Ethnic differences in use of outpatient doctor visits were small, but contrary to predictions, they did not decrease over time. Clearly, disparities in use of healthcare are not purely attributable to economic factors; other factors not examined in the present study may include longstanding differences in habitual patterns of accessing care, cultural barriers, and bias or discrimination (Callahan *et al.*, 2006).

Ethnic/racial differences in healthcare use also were observed for emergency department visits and hospitalizations, but only in the analysis including pregnancy status. In both cases, differences were found primarily between Hispanic participants and members of other racial/ethnic groups. For emergency department visits, Hispanic participants reported less use than White or African American participants at baseline. At follow-up, these discrepancies were not only attenuated but also Hispanic participants reported significantly higher use than all other participants. At the same time that Hispanic participants' use of emergency department services increased, their rates of hospitalization decreased. This suggests that the need for hospitalizations among Hispanic participants may have been reduced by seeking care at earlier stages of a problem rather than waiting until problems had become relatively dire. Unfortunately, we did not see similar increases in more traditional forms of outpatient preventive care.

We found mixed support for the hypothesis that differences in healthcare use as a function of SES would diminish with entry into military service. In the baseline sample, SES was significantly related to the use of outpatient doctor visits, outpatient surgery, and injury treatment, such that participants with higher SES reported more healthcare visits than did those with lower SES. As was true for ethnic differences, effects of SES were particularly pronounced for outpatient doctor visits, again likely

reflecting deficits in preventive care. In support of our prediction that demographic differences in care would be attenuated over time, both outpatient doctor visits and outpatient surgery visits increased significantly more over time among low SES respondents than among higher SES respondents. In contrast, rates of injury treatment remained consistently higher among high SES participants at both time points. Persisting SES differences despite equalization of structural access to care, as with persisting racial/ethnic differences, may derive from any number of sources and cannot be determined on the basis of the present data.

Although interesting, racial/ethnic and SES differences in healthcare use were small and inconsistent. In the longitudinal sample, racial/ethnic differences were observed only when pregnancy status was controlled, whereas SES differences were observed only when pregnancy status was not controlled. This suggests that SES and race/ethnicity might be accounting for some of the same variability in patterns of healthcare use. However, a direct examination of the association between SES and race/ethnicity in our sample revealed only a small association ($\eta^2 = 0.08$), making it unlikely that overlapping variance can fully explain the obtained results.

There are some limitations of the present research that should be noted. We relied on self-reported information to assess both health status and healthcare use. Self-reports may suffer from response biases, and failures or distortions of recall. It would be informative to replicate the present study by using archival records of actual care rather than self-reported data. Also, we did not have information regarding participants' health insurance coverage prior to service entry. Although access to health insurance is certainly related to our primary study variables of SES, race/ethnicity, and life stage, our analyses would have been more powerful if we had been able to control for whether respondents were previously insured. This, combined with high levels of variability within demographic groups, may account for the generally small magnitude of group differences. Such small effect sizes are typical of correlational research, particularly with respect to interaction effects (McClelland and Judd, 1993).

High study attrition also may limit the generalizability of our results. However, relatively low response rates are typical in longitudinal research involving multiple follow-up surveys over extended periods (Tanielian and Jaycox, 2008; Polusny et al., 2010). Furthermore, the fact that attrition analyses revealed no significant differences between respondents and nonrespondents in baseline use of healthcare indicates that our final sample was not systematically different from the initial sample in terms of the primary variables of interest.

In this study, we were able to longitudinally compare patterns of healthcare use among young adults across an important transition into Navy service, but we did not have a comparison group of civilian participants transitioning into young adulthood. This makes it difficult to know how our results might generalize beyond the military context. For instance, differences as a function of sex, race/ethnicity, and SES may have been attenuated in the present sample, relative to the general population, because military selection and screening procedures are likely to produce a homogeneously healthy group of young adults (Smith et al., 2007). Military enlistment standards disqualify individuals with a current diagnosis or history of a number of medical, dental, mental health, or substance use problems (U.S. Department of

Defense, 2010). Estimates suggest that substantially less than half of young US adults would qualify for military enlistment because they fail to meet enlistment standards in the areas of education, aptitude, weight, number of dependents, convictions, or drug-related offenses (Hsu *et al.*, 2007; Asch *et al.*, 2009; Cawley and Maclean, 2010). In addition to the homogenizing effects of military screening, self-selection and differential attrition may contribute to creating a subpopulation of young adults that is quite healthy within the military. Besides reducing apparent differences between sociodemographic groups, this may have the consequence of dampening apparent changes in health status and healthcare use across time.

Ultimately, our use of a military population may be regarded as either a limitation or a strength. Because military personnel constitute a unique population, the applicability of our results to the larger debate about the effects of universal healthcare on healthcare use may be limited. However, given that healthcare coverage in the USA is not universally available to young adults, studies like the present one provide a unique window into the effects of access to services through a universal healthcare system.

Despite its limitations, the present research has several notable strengths. Few previous studies have longitudinally examined changes in patterns of healthcare use. Moreover, by simultaneously considering the impact of sex, race/ethnicity, and SES, while controlling for health status, we were able to identify the unique contributions of each to the overall pattern of healthcare use. In addition, by considering five qualitatively different types of healthcare use, we were able to illuminate important differences in the factors predictive of each type of care. Our results suggest that individuals with access to universal healthcare are likely to increase their overall use of services. However, these effects were quite small in absolute terms, and they were strongest for preventive care rather than more intensive and expensive kinds of services.

A final caveat to our conclusions is in order. Throughout this paper, we have interpreted changes in healthcare use upon entering the military as resulting from increased access to care. However, this is not the only possible explanation. For example, increases in physical activity levels, physical fitness, and the intensity of physical demands associated with military training and service also may have consequences for health status and healthcare use. Similarly, military norms and culture may influence the manner in which service members use healthcare. Thus, increases in outpatient visits over time may reflect military policies promoting the use of outpatient services for preventive care in addition to, or instead of, reflecting the simple availability of cost-free healthcare. If norms are more influential within some demographic groups than within others, this alternative underlying cause could also explain group differences in patterns of healthcare use over time. In addition, as we have noted previously, there may be cultural barriers to care that deter some individuals from taking full advantage of the opportunities offered by universal coverage. These include group differences in cultural norms, values, and health behaviors; language and citizenship barriers; differences in communication styles between patients and doctors; bias among medical professionals; and lack of familiarity with the medical system (Williams and Collins, 2001; Ashton *et al.*, 2003; Callahan *et al.*, 2006). More research is needed to further illuminate the reasons for health disparities and the most effective approaches for reducing them. In particular, as the structural

reforms of the Affordable Care Act expand health insurance coverage among the currently uninsured, future efforts will need to examine how health insurance characteristics including insurer type (i.e., military, private, or public), policy holder (i.e., young adult versus parent), policy type (i.e., group versus individual policy), coverage level, and point of purchase (i.e., state health insurance exchange versus employer) impact young adults' use of healthcare services.

ACKNOWLEDGEMENTS

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REPORT DOCUMENTATION PAGE

1. REPORT DATE (DD MM YY)	2. REPORT TYPE	3. DATES COVERED (from – to)
14 05 12	Journal submission	1996–1999

4. TITLE
Changes in Healthcare Use Across the Transition From Civilian to Military Life

5a. Contract Number:
5b. Grant Number:
5c. Program Element Number:
5d. Project Number:
5e. Task Number:
5f. Work Unit Number: 60503

6. AUTHORS
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8. PERFORMING ORGANIZATION REPORT NUMBER

Report No. 12-37

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10. SPONSOR/MONITOR'S ACRONYM(S)
NMRC/BUMED

11. SPONSOR/MONITOR'S REPORT NUMBER(s)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

14. ABSTRACT

The primary goal of the present study was to examine patterns of health care use in a sample of young adults entering the U.S. Navy and to examine changes in patterns of use over time following entry into the Military Health System (MHS). Analysis of covariance was used to compare health care use at baseline and across time as a function of sex, race/ethnicity, and socioeconomic status, while controlling for differences in physical health status. Few systematic differences in reported use were noted with respect to socioeconomic status or race/ethnicity. Entrance into the MHS was marked by greater use of preventive care than used while still a civilian during the year before entering military service. Women consistently used more health care than did men, and women's use increased more over time. However, this disproportionate increase was largely driven by pregnancy during military service. Whereas both men and women reported significant increases in outpatient visits over time, only pregnant service women reported a significant increase over time in hospitalizations (and a marginally significant increase in emergency department visits). Patterns of increased use among female service members parallel those of their civilian peers. In contrast, unlike their civilian counterparts, male service members demonstrated increased use of preventive care but no increase in use of emergency department care over time. These results suggest that individuals with access to universal health care are likely to increase their overall use of services. However, these effects were quite small in absolute terms, and they were strongest for preventive care rather than more intensive and expensive kinds of services.

15. SUBJECT TERMS
health care use, military, young adulthood, longitudinal, disparities, sex, pregnancy

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	18a. NAME OF RESPONSIBLE PERSON
a. REPORT UNCL	b. ABSTRACT UNCL	c. THIS PAGE UNCL	UNCL	19	Commanding Officer

18a. NAME OF RESPONSIBLE PERSON
Commanding Officer

18b. TELEPHONE NUMBER (INCLUDING AREA CODE)
COMM/DSN: (619) 553-8429

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39-18